



Alumni: Zoltán Toroczka, University of Notre Dame

July 1, 2015





Zoltan

Toroczkai now at the University of Notre Dame

When Zoltán Toroczkai began at the Lab in 2000, it was as a Director's Funded Fellow for what had been the Complex System group in Theoretical Division also working with the Center for Nonlinear Studies (CNLS). In 2002 he became a research staff member, and from 2004 until 2006 he served as the Deputy Director of the Center for Nonlinear Studies.

While at Los Alamos, he obtained a Laboratory Directed Research and Development funding to investigate the statistical physics of complex networks such as those used to model disease spread in realistic urban environments.

“One of the scenarios we were asked to run was with smallpox,” said Toroczkai, “since it has a 30 percent mortality rate, it would be important to model transmission patterns to better understand what preventative actions to take.”

The work, published in *Nature* in 2004, involved simulations of the 1.6 million people in the Portland, Oregon area including adults dropping off children school, then going out to lunch and stopping off at a grocery store after work. The simulations also included factors such as gender, education and a host of other factors.

“Once we’d run some models, people were surveyed about how they actually moved during their days to see how close we’d gotten with our predictions. That allowed us to further refine our results,” he said.

Currently, Toroczkai finds himself at home at the University of Notre Dame as a professor in the Physics, and concurrently in the Computer Science and Engineering Departments.

He continues to study complex systems and considers himself a “problem solver” above all else. More recently he applies his skills to everything from working to understand the cortical network in the primate brain (also published in *Science*) to NP-hard optimization problems¹ and to modeling commuter traffic in the US highway system².

He would particularly like to acknowledge his collaborations with Bob Ecke, David Sharp, Eli Ben-Naim, Matthew Hastings, Cynthia and Charles Reichhardt while employed at the Lab.

For more information on his work, visit Toroczkai’s University [webpage](#).

(¹ published in *Nature Physics*, ² published in *Nature Communications*)

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